

REMARKS

This is intended as a full and complete response to the Office Action dated February 22, 2008, having a shortened statutory period for response set to expire on May 22, 2008.

Claims 1 and 25-26 have been amended and new claims 29-32 have been added to more clearly recite various aspects of the invention. Applicants believe no new matter has been introduced by the amendments and the new claims presented herein. The amendments and the new claims have been presented in a good faith effort to advance prosecution on the merits. Claims 9-11 and 28 have been cancelled without prejudice. Applicants reserve the right to subsequently take up prosecution of the claims as originally filed in this application in a continuation, a continuation-in-part and/or a divisional application. Please reconsider the claims pending in the application for reasons discussed below.

The Examiner objects to Figures 6-8 for lacking a PRIOR ART legend. No further detail is provided by the Examiner in the office action. Accordingly, Applicants can only assume that the basis of the objection is the same as in the previous office action mailed July 6, 2007. In that office action, Figures 6-8 are objected in view of "Deepwater Geohazard Analysis Using Prestack Inversion" by de Kok et al., SEG September 2001 Expanded Abstracts ("de Kok"). Figures 7-8 are objected to for lacking a PRIOR ART legend in view of Prestack Waveform Inversion Using A Genetic Algorithm – The Present And The Future by S. Mallick, CSEG Recorder (June 2001) ("Mallick 2001"). Applicants respectfully traverse this objection for the same reasons given in the RCE preliminary amendment filed November 5, 2007. Therefore, the same arguments are repeated below for the Examiner's convenience.

Applicants respectfully submit that neither de Kok nor Mallick 2001 is a proper 102 reference. "For 35 U.S.C. 102(a) to apply, the reference must have a publication date earlier in time than the effective filing date of the application, and must not be applicant's own work." MPEP 706.02(a)(II)(C). Further, where Applicant is the author of a reference and the reference was published less than one year prior to the date of the filing date of the application, the reference cannot be used against the Applicant since it

does not satisfy the 1-year time requirement of 35 USC 102(b). See MPEP 716.10, Example 1.

de Kok is authored by Rob de Kok, Nader Dutta, Mashuir Khan and Subhashis Mallick, all of whom were employed by WesternGeco at the time the reference was published, which was September 9-14, 2001. Both Nader Dutta and Subhashis Mallick are inventors of the present application. It is clear that Applicants of the present application are authors of de Kok and de Kok was published less than one year prior to the date of the filing date of the application. Accordingly, de Kok is Applicants' own work and cannot be used against the Applicants since it does not satisfy the 1-year time requirement of 35 USC 102(b). See MPEP 706.02(a)(II)(C) and MPEP 716.10, Example 1.

Mallick 2001 is authored by Subhashis Mallick and published on June, 2001. Subhashis Mallick is an inventor of the present application. It is clear that Applicant of the present application is the author of Mallick 2001 and that Mallick 2001 was published less than one year prior to the date of the filing date of the application. Accordingly, Mallick 2001 is Applicants' own work and cannot be used against the Applicants since it does not satisfy the 1-year time requirement of 35 USC 102(b). See MPEP 706.02(a)(II)(C) and MPEP 716.10, Example 1.

Neither de Kok nor Mallick 2001 is prior art to the present application. Applicants respectfully submit therefore that Figures 6-8 do not require the PRIOR ART legend since they do not illustrate prior art. Withdrawal of the objection is respectfully requested.

Claims 1-5 and 7-28 stand rejected under 35 USC 102(a) as being anticipated by de Kok. Applicants respectfully traverse this rejection. MPEP 706.02(a)(II)(C) specifically states that for "35 U.S.C. 102(a) to apply, the reference must have a publication date earlier in time than the effective filing date of the application, and must not be applicant's own work." Further, where Applicant is the author of a reference and the reference was published less than one year prior to the date of the filing date of the application, the reference cannot be used against the Applicant since it does not satisfy the 1-year time requirement of 35 USC 102(b). See MPEP 716.10, Example 1. de Kok is authored by Rob de Kok, Nader Dutta, Mashuir Khan and Subhashis Mallick, all of

whom were employed by WesternGeco, the assignee of the present application, at the time the reference was published, which was September 9-14, 2001. Both Nader Dutta and Subhashis Mallick are inventors of the present application. It is clear that Applicants of the present application are authors of de Kok and de Kok was published less than one year prior to the date of the filing date of the application. Accordingly, de Kok is Applicants' own work and cannot be used against the Applicants since it does not satisfy the 1-year time requirement of 35 USC 102(b). See MPEP 706.02(a)(II)(C) and MPEP 716.10, Example 1. Withdrawal of the rejection is respectfully requested.

Claims 1-5 and 7-28 stand rejected under 35 USC 102(a) as being anticipated by The Petrophysical Basis For Shallow-Water Flow Prediction Using Multicomponent Seismic Data by A. Huffman and J. Castagna (The Leading Edge September 2001) ("H1").

Applicants respectfully submit that H1 does not teach or disclose applying a pre-stack full waveform inversion on only the P-wave seismic data. In contrast, H1 requires multicomponent data. The data obtained in H1 are obtained using multicomponent geophones on ocean bottom cable (OBC). (See e.g., H1, page 1034). The multicomponent data includes not only P-wave seismic data but also other components, such as S-wave seismic data. In contrast, the P-wave seismic data processed in claim 1 are obtained using hydrophones towed on a streamer. Hydrophones, unlike geophones, can only measure acoustic or P-wave seismic data. (See e.g., paragraph [0033]). Accordingly, claim 1 recites applying a pre-stack full waveform inversion on only the P-wave seismic data. Please note also that in claim 1, the pre-stack full waveform inversion is not applied to the S-wave seismic data.

H1 also does not teach or disclose developing a geologic model of shallow water flow risk areas; and performing a stratigraphic analysis on only the P-wave seismic data to determine a control location within the P-wave seismic data, as recited in claim 1.

For the above reasons, claim 1 is patentable over H1. Claims 2-5, 7-8 and 12-25 are also patentable over H1 since they depend from claim 1. Claims 9-11 and 28 have been cancelled without prejudice, thereby rendering the rejection moot with respect to these claims. Withdrawal of the rejection is respectfully requested.

As to claim 26, H1 also fails to teach or disclose processing P-wave seismic data to enhance its stratigraphic resolution, wherein the P-wave seismic data are obtained from marine towed hydrophones, which are recited in claim 26. As mentioned above, the multicomponent data obtained in H1 are obtained using ocean bottom cable geophones as opposed to marine towed hydrophones.

H1 also does not teach or disclose "performing a stratigraphic analysis on the P-wave seismic data and evaluating the seismic attributes of the P-wave seismic data," as recited in claim 26. For the above reasons, claim 26 is also patentable over H1. Claim 27 is also patentable over H1 since it depends from claim 26. Withdrawal of the rejection is respectfully requested.

Claims 1-5 and 7-28 stand rejected under 35 USC 103(a) in view of Hybrid Seismic Inversion: A Reconnaissance Tool For Deepwater Exploration, 11/2000 by Mallick et al. (Mallick 2000). However, the Examiner fails to provide an explanation as to how claims 1-5 and 7-28 are obvious in view of Mallick 2000. An explanation for how claims 1-5 and 7-28 are obvious in view of Mallick 2000 is respectfully requested. Nevertheless, a brief review of Mallick 2000 indicates that Mallick 2000 does not teach or disclose "developing a geologic model of shallow water flow risk areas; and performing a stratigraphic analysis on only P-wave seismic data to determine a control location within the P-wave seismic data," as recited in claim 1. Mallick 2000 also does not teach or disclose "computing a ratio between the P-wave velocity and the S-wave velocity; and identifying shallow water flow risk areas using the P-wave velocity to the S-wave velocity ratio, as recited in claim 1. For these reasons, claim 1 and all claims depending therefrom are patentable over Mallick 2000.

As to claim 26, Mallick 2000 does not teach or disclose selecting a control location comprising: performing a stratigraphic analysis on the P-wave seismic data; and evaluating the seismic attributes of the P-wave seismic data, as recited in claim 26.

Mallick 2000 also does not teach or disclose “determining the shallow water flow risk using the ratio between the P-wave velocity and the S-wave velocity in the 3D volume.” For these reasons, claims 26 and 27 are patentable over Mallick 2000.

Claims 1-5, 7-15 and 17-28 stand rejected under 35 USC 102(e) as being anticipated by US Patent No. 6,694,261 (“H2”). Like H1, H2 also fails to teach or disclose applying a pre-stack full waveform inversion on only the P-wave seismic data. In contrast, H2 describes using multicomponent data that are obtained using geophones. (See H2, column 4, line 47 to column 5, line 10 and column 12, line 5-8). The multicomponent data includes not only P-wave seismic data but also other components, such as S-wave seismic data. In contrast, the P-wave seismic data processed in claim 1 are obtained using hydrophones towed on a streamer. Hydrophones, unlike geophones, can only measure acoustic or compressional waves (P-wave) seismic data. (See e.g., paragraph [0033]). Accordingly, claim 1 recites applying a pre-stack full waveform inversion on only the P-wave seismic data. Please note also that in claim 1, the pre-stack full waveform inversion is not applied to the S-wave seismic data.

H2 also does not teach or disclose developing a geologic model of shallow water flow risk areas; and performing a stratigraphic analysis on only P-wave seismic data to determine a control location within the P-wave seismic data, as recited in claim 1.

For these reasons, claim 1 is patentable over H2. Claims 2-5, 7-8 and 12-25 are also patentable over H2 since they depend from claim 1. Claims 9-11 and 28 have been cancelled without prejudice, thereby rendering the rejection moot with respect to these claims. Withdrawal of the rejection is respectfully requested.

As to claim 26, H2 also fails to teach or disclose processing P-wave seismic data to enhance its stratigraphic resolution, wherein the P-wave seismic data are obtained from marine towed hydrophones, which are recited in claim 26. As mentioned above, the multicomponent data obtained in H2 are obtained using ocean bottom cable geophones as opposed to marine towed hydrophones.

H2 also does not teach or disclose “performing a stratigraphic analysis on the P-wave seismic data and evaluating the seismic attributes of the P-wave seismic data,” as

recited in claim 26. For the above reasons, claim 26 is also patentable over H2. Claim 27 is also patentable over H2 since it depends from claim 26. Withdrawal of the rejection is respectfully requested.

Claims 1-5, 7-15 and 17-28 stand rejected under 35 USC 103(a) in view of Hybrid Seismic Inversion: A Reconnaissance Tool For Deepwater Exploration, 11/2000 by Mallick et al. (Mallick 2000). This rejection is a repeat of an earlier rejection. Accordingly, Applicants will not address this rejection twice to avoid redundancy.

Claims 1-5, 7-15 and 17-28 stand rejected under 35 USC 103(a) as being unpatentable over Some Practical Aspects Of Prestack Waveform Inversion Using A Genetic Algorithm: An Example From The East Texas Woodbine Gas Sand by S. Mallick, Geophysics, Vol. 64, No. 2, pages 326-336 (March-April 1999) ("Mallick 1999") in view of H2.

Neither Mallick 1999 nor H2, alone or in combination, teaches or discloses: "developing a geologic model of shallow water flow risk areas; and performing a stratigraphic analysis on only P-wave seismic data to determine a control location within the P-wave seismic data" and "applying a pre-stack full waveform inversion on only the P-wave seismic data," as recited in claim 1. Accordingly, Applicants respectfully submit that claim 1 is patentable over Mallick 1999 in view of H2. Claims 2-5, 7-8, 12-15 and 17-25 are also patentable over Mallick 1999 in view of H2, since they depend from claim 1. Claims 9-11 and 28 have been cancelled without prejudice, thereby rendering the rejection moot with respect to these claims. Withdrawal of the rejection is respectfully requested.

Neither Mallick 1999 nor H2, alone or in combination, teaches or discloses "processing P-wave seismic data to enhance its stratigraphic resolution, wherein the P-wave seismic data are obtained from marine towed hydrophones" and "performing a stratigraphic analysis on the P-wave seismic data; and evaluating the seismic attributes of the P-wave seismic data," as recited in claim 26. Accordingly, Applicants respectfully submit that claim 26 is patentable over Mallick 1999 in view of H2. Claim 27 is also patentable over Mallick 1999 in view of H2 since it depends from claim 26. Withdrawal of the rejection is respectfully requested.

Claim 6 stands rejected under 35 USC 103(a) as being unpatentable over Mallick 1999 in view of H2 and Kirchhoff Imaging As A Tool For AVO/AVA Analysis by Tygel et al., The Leading Edge (August 1999) ("Tygel"), or de Kok or Mallick 2000. As to de Kok, MPEP 706.02(a)(II)(C) specifically states that for "35 U.S.C. 102(a) to apply, the reference must have a publication date earlier in time than the effective filing date of the application, and must not be applicant's own work." Further, where Applicant is the author of a reference and the reference was published less than one year prior to the date of the filing date of the application, the reference cannot be used against the Applicant since it does not satisfy the 1-year time requirement of 35 USC 102(b). See MPEP 716.10, Example 1. de Kok is authored by Rob de Kok, Nader Dutta, Mashuir Khan and Subhashis Mallick, all of whom were employed by WesternGeco, the assignee of the present application, at the time the reference was published, which was September 9-14, 2001. Both Nader Dutta and Subhashis Mallick are inventors of the present application. It is clear that Applicants of the present application are authors of de Kok and de Kok was published less than one year prior to the date of the filing date of the application. Accordingly, de Kok is Applicants' own work and cannot be used against the Applicants since it does not satisfy the 1-year time requirement of 35 USC 102(b). See MPEP 706.02(a)(II)(C) and MPEP 716.10, Example 1.

As to Mallick 1999, H2, Tygel and Mallick 2000, neither of these references teaches or discloses "developing a geologic model of shallow water flow risk areas; and performing a stratigraphic analysis on only P-wave seismic data to determine a control location within the P-wave seismic data," as recited in claim 1. Since claim 6 depends from claim 1 and since neither Mallick 1999 nor H2 nor Tygel nor Mallick 2000, alone or in combination, teaches, discloses or suggests all the limitations of claim 1, claim 6 is therefore also patentable over Mallick 1999, H2, Tygel and Mallick 2000. Accordingly, withdrawal of the rejection is respectfully requested.

In paragraph 30 of the office action, the Examiner also cites US Patent No. 6665615 (Riel). However, the Examiner mentions nothing about using this as the basis of rejection under either 35 USC 102 or 103. Nevertheless, a brief review of Riel indicates that Riel does not teach or disclose "developing a geologic model of shallow water flow risk areas; and performing a stratigraphic analysis on only P-wave seismic

data to determine a control location within the P-wave seismic data” and “applying a pre-stack full waveform inversion on only the P-wave seismic data,” as recited in claim 1; or “processing P-wave seismic data to enhance its stratigraphic resolution, wherein the P-wave seismic data are obtained from marine towed hydrophones” and “performing a stratigraphic analysis on the P-wave seismic data; and evaluating the seismic attributes of the P-wave seismic data,” as recited in claim 26. Accordingly, Applicants believe that claims 1-8, 12-15 and 17-28 are patentable over Riel.

In paragraph 31 of the office action, the Examiner also cites Shallow Water Flow Prediction Using Prestack Waveform Inversion of Conventional 3D Seismic Data and Rock Modelling, 2002 by Mallick et al. (Mallick 2002). This reference is published after the filing date of the present application. Accordingly, this reference is an improper reference.

With regard to new claims 29-32, Applicants submit that claims 29-32 recite subject matter that is neither disclosed, taught, nor otherwise suggested by the cited references, and as such, allowance of these claims is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed invention. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

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